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PATENT  
Attorney Docket No. 10151-1

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Patent Application of:	)	
W. Roth et al.	)	
Serial No. 09/305,019	)	Examiner: Tam Nguyen
Filed: May 4, 1999	)	Group Art Unit: 1764

APPELLANTS' REPLY BRIEF UNDER 37 CFR 1.193(b)

Fairfax, Virginia 22030

Commissioner for Patents  
Washington, D.C. 20231

Sir:

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Appellants respectfully request the honorable Board of Patent Appeals and Interferences to consider the following comments in response to the arguments raised in the Examiner's Answer mailed January 31, 2001.

1. On page 3, lines 11-13 of the Examiner's Answer, the Examiner states that EP 0733608 (hereinafter "the '608 reference") discloses:

"that the transalkylation process can be operated in a separate reactor, but it is preferred to recycle the polyalkylbenzenes to the transalkylation reactor (See page 2 through page 3)".

Based on this assessment of the reference, the Examiner rejects appellants' argument that the '608 reference is fundamentally different from the process of the invention in requiring recycle of the polyalkylated species to the alkylation reactor. Thus, on page 6, lines 12-15 of the Examiner's Answer, the Examiner states that appellants' argument:

“is not persuasive because, in lines 20 and 21 of page 2, the reference discloses that the polyethylbenzenes can be directed to a separate transalkylation reactor or recycled to the alkylation reactor.”

It is respectfully submitted that this is a fundamental mischaracterization of the ‘608 reference which leads the Examiner to misapply the reference. Thus the discussion of separate alkylation and transalkylation reactors on page 2, lines 20 and 21 of the ‘608 reference is in relation to conventional vapor phase processes for production of ethylbenzene. In contrast, it is apparent from the ensuing discussion on page 2, lines 22-31 that the invention in the ‘608 reference is concerned with processes in which the polyethylbenzenes (PEB) are recycled to alkylation reactor and in which:

“it is important that the catalyst used in the alkylation of benzene with ethylene in a process with PEB recycle to the alkylation reactor have sufficient transalkylation activity to convert recycled polyalkylbenzenes at a rate sufficient to maintain the volume of the recycled polyalkylbenzenes stream at a level within process capacity.”

Thus the teaching of crystal size in the ‘608 patent is not in the context of recycling of polyalkylbenzenes being preferred but instead is in the context of an alkylation catalyst which is required to have sufficient transalkylation activity to effect both alkylation and transalkylation. In other words, the ‘608 reference is directed to a process in which alkylation and transalkylation are carried out in the same reactor.

2. On page 4, lines 6-9 of the Examiner’s Answer, the Examiner argues that it would have been obvious to have modified the ‘608 process by utilizing MCM-56 as an alkylation catalyst and TEA-mordenite as a transalkylation catalyst as suggested by U.S. Patent No. 5,557,024 (hereinafter “Cheng”) because the ‘608 reference discloses that any crystalline aluminosilicate catalyst can be used in the process. As will be discussed

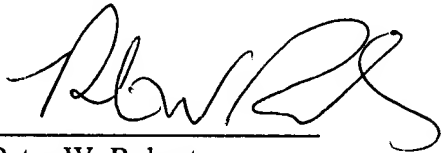
below the '608 reference does not teach "any" crystalline aluminosilicate catalyst but, more importantly, this argument flows from the Examiner's mischaracterization of the '608 reference. Cheng discloses a process in which the alkylation catalyst is MCM-56 and the polyalkylated product can be recycled to the alkylation reactor (see column 14, lines 21-22) or may be reacted in a transalkylation reactor with a different transalkylation catalyst selected from MCM-49, MCM-22, PSH-3, SSZ-25, zeolite X, zeolite Y, zeolite beta and mordenite (column 14, lines 26-30). If the different transalkylation catalyst is mordenite, Cheng teaches that TEA-mordenite can be used. However, given the fact the '608 reference is directed to a catalyst which is required to effect both alkylation and transalkylation, it is respectfully submitted that the only "obvious" way to modify the teaching of the '608 reference in view of Cheng is to use small crystal MCM-56 in the alkylation reactor and adopt the Cheng embodiment in which the polyalkylated product is recycled to the alkylation reactor.

3. As indicated in the preceding paragraph, the Examiner argues that the '608 reference discloses a transalkylation process in which "any" aluminosilicate catalyst having a crystal size of less than 0.5 micron can be used (See Examiner's Answer at page 6, lines 18-19). Again, it is respectfully submitted that this is a fundamental mischaracterization of the '608 reference which leads the Examiner to misapply the reference. Nowhere in the '608 reference is there a disclosure or suggestion that "any" aluminosilicate catalyst having the required crystal size can be used in the process of the reference. It is true that the reference does not identify by name the particular aluminosilicate to be used, casting doubt as to whether the reference constitutes an enabling disclosure. However, the reference requires on page 2, lines 20-22 that the "catalyst is an aluminosilicate powder with a crystalline structure that is primarily monoclinic aluminosilicate but which may contain up to about 40% orthorhombic crystalline structure". As stated in the Amended Appellants' Brief dated December 28, 2000, this characterization excludes mordenite since it is well known that mordenite has an orthorhombic structure (see, for example, "Atlas of Zeolite Structure Types", Meier and Olson, Butterworth-Heinemann, 1992, p.144, copy attached). Thus, it is respectfully

submitted that the clear teaching of the '608 reference is that a small crystal, primarily monoclinic aluminosilicate (in other words **not** mordenite) should be used and not "any" small crystal aluminosilicate. This difference between the '608 reference and the present invention is completely overlooked in the Examiner's Answer.

In view of the foregoing comments, it is respectfully submitted that the Examiner's mischaracterization and misapplication of the '608 reference has led the Examiner to erroneously reject the claims of this application under 35 U.S.C. § 103(a) as being unpatentable over the '608 reference in view of Cheng and in view of Cheng and U.S. Patent No. 4,891,458 (Innes). Accordingly, reversal of these rejections by the Board is respectfully requested.

Respectfully submitted,

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Commissioner for Patents  
Washington, D.C. 20231

on March 28, 2001.



Peter W. Roberts

# **ATLAS OF ZEOLITE STRUCTURE TYPES**

**W.M. Meier and D.H. Olson**

**Third Revised Edition  
1992**

**Published on behalf of the  
Structure Commission of the International Zeolite Association**

**by**

**Butterworth-Heinemann**

**London Boston Singapore Sydney Toronto Wellington**

# MOR

# MORDENITE

Cmcm

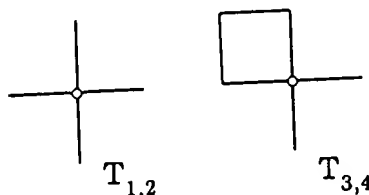
Secondary building  
units:

5-1

Framework density:

17.2 T/1000 Å<sup>3</sup>

Loop configuration  
of T-atoms:



Coordination sequences:

T<sub>1</sub>(16) 4 12 22 38 60 88 115 155 204 242  
T<sub>2</sub>(16) 4 12 20 37 64 87 114 154 198 241  
T<sub>3</sub>(8) 4 11 24 39 54 86 126 156 195 242  
T<sub>4</sub>(8) 4 11 24 39 60 92 122 148 195 250

Channels:

[001] **12** 6.5 x 7.0\* ↔ [010] **8** 2.6 x 5.7\*

Fault planes:

(010), (100)

Type material:

**Mordenite** Na<sub>8</sub>[Al<sub>8</sub>Si<sub>40</sub>O<sub>96</sub>] · 24 H<sub>2</sub>O  
orthorhombic, Cmcm, a=18.1, b=20.5, c=7.5 Å<sup>(1)</sup>

Isotypic framework  
structures:

Na-D<sup>(2)</sup>

Ca-Q<sup>(3)</sup>

Zeolon

Large port mordenite<sup>(4)</sup>  
LZ-211<sup>(5)</sup>

Alternate designations:

Ptilolite

Arduinite (discredited)

Flokite (discredited)

## References:

- (1) W. M. Meier, Z. Kristallogr. **115**, 439 (1961).
- (2) R. M. Barrer and E. A. D. White, J. Chem. Soc. **1952**, 1561 (1952).
- (3) M. Koizumi and R. Roy, J. Geol. **68**, 41 (1960).
- (4) L. B. Sand, Molecular Sieves, Soc. of Chem. Industry, London, p. 71 (1968).
- (5) D. W. Breck and G. W. Skeels, US Patent 4,503,023 (1985).